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PATENT
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Martin MCCREESH et al.

Serial No.: 09/696,177

Group Art Unit: 2152

Filed: October 26, 2000

For: MONITORING OF COMPUTER USE



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JAN 09 2001

Technology Center 2100

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

The benefit of the filing date of prior foreign application No. **990893** filed in **Irish** on **October 26, 1999**, is hereby requested and the right of priority provided in 35 U.S.C. §119 is hereby claimed.

In support of this claim, filed herewith is a certified copy of said original foreign application.

Respectfully submitted,

JACOBSON, PRICE, HOLMAN & STERN, PLLC

By: _____

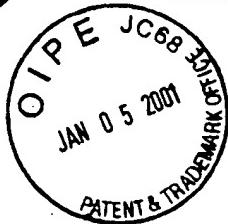
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Atty. Docket No.: P66032US0
Date: January 5, 2001
JCH:iy



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I HEREBY CERTIFY that annexed hereto is a true copy of documents filed in connection with the following patent application:

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Technology Center 210

Application No. 990893

Date of filing 26 October 1999

Applicant IONTAS LIMITED, An Irish company of
9 Holmwood, Cabinteely, Dublin 18,
Ireland.

**CERTIFIED COPY OF
PRIORITY DOCUMENT**

Dated this 23 day of October, 2000.

An officer authorised by the
Controller of Patents, Designs and Trademarks.

L 990893

FORM NO. 1

REQUEST FOR THE GRANT OF A PATENT

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PATENTS ACT, 1992

JAN 09 2001

Technology Center 2100

The Applicant(s) named herein hereby request(s)

X the grant of a patent under Part II of the Act

the grant of a short-term patent under Part III of the Act
on the basis of the information furnished hereunder.

1. Applicant(s)

Name Iontas Limited

Address 9 Holmwood
Cabinteely
Dublin 18
Ireland

Description/Nationality

An Irish company

2. Title of Invention

"Monitoring of computer usage"

3. Declaration of Priority on basis of previously filed application(s) for same invention (Sections 25 & 26)

Previous filing date

Country in or for
which filed

Filing No.

4. Identification of Inventor(s)

Name(s) of person(s) believed
by Applicants(s) to be the inventor(s)

Name: McCREESH, Martin
Address: Mahereagh,
Kilkerley,
Dundalk,
County Louth,
Ireland

Name: STOCKTON, Joseph
Address: 9 Holmwood,
Cabinteely,
Dublin 18,
Ireland

5. Statement of right to be granted a patent (Section 17(2) (b))

The Applicant derives the rights to the Invention by virtue of a Deed of Assignment dated September 6, 1999

6. Items accompanying this Request – tick as appropriate

- (i) prescribed filing fee (£100.00)
- (ii) specification containing a description and claims
 specification containing a description only
 Drawings referred to in description or claims
- (iii) An abstract
- (iv) Copy of previous application (s) whose priority is claimed
- (v) Translation of previous application whose priority is claimed
- (vi) Authorisation of Agent (this may be given at 8 below if this Request is signed by the Applicant (s))

7. Divisional Application (s)

The following information is applicable to the present application which is made under Section 24 –

Earlier Application No:

Filing Date:

8. Agent

The following is authorised to act as agent in all proceedings connected with the obtaining of a patent to which this request relates and in relation to any patent granted -

Name

John A. O'Brien & Associates

Address

The address recorded for the time being in the Register of Patent Agents, and currently Third Floor, Duncairn House, 14 Carysfort Avenue, Blackrock, Co. Dublin, Ireland.

9. Address for Service (if different from that at 8)

As above

Signed _____

JOHN A. O'BRIEN & ASSOCIATES

Date October 26, 1999

990893

APPLICANT/INVENTOR

- 1 -

"Monitoring of computer usage"

Introduction

- 5 The invention relates to monitoring of computer usage.

Statements of Invention

According to the invention, there is provided a computer usage monitoring tool
10 comprising means for determining which software application is currently executing
on a computer and for logging usage data to a storage medium, transparently to a
user.

In one embodiment, the tool comprises means for determining the current
15 applications by identifying visible windows.

In one embodiment, the tool comprises means for determining the current
application by identifying the active window.

20 In one embodiment, the tool comprises means for recording an application as
inactive if its window is active and there are no user inputs for a pre-set time period.

In one embodiment, the tool further comprises means for capturing window titles
and using the titles and window handles to identify an application.

25 In one embodiment, the tool further comprises means for maintaining window
foreground and background timers indicating window display times with user input
and without user input respectively.

In one embodiment, the tool further comprises means for maintaining a linked list of windows uniquely identified by window handles and title text, and for dynamically updating said linked list with new entries.

- 5 In another embodiment, the tool further comprises an activation timer which activates monitoring at configurable time periods.

In one embodiment, the tool further comprises means for monitoring user input activity between activation by the activation timer.

10

Preferably, the tool comprises a frame timer for controlling timing of frame writes to a log file.

15

In one embodiment, the tool further comprises a log file timer for controlling timing of log file transfers.

Preferably, the tool comprises a protection utility comprising means for restarting the Data Collection Utility if a user attempts to terminate same and shutdown the operating system if a user attempts to terminate the protection utility.

20

The protection utility is activated if the user attempts to terminate the collection utility. Its purpose is to restart the collection utility after a short interval. If the user attempts to stop the protection utility it shuts down the operating system. It has no association with the activation timer.

25

Detailed Description of the Invention

The invention will be more clearly understood from the following description of some embodiments thereof given by way of example only with reference to the

30 accompanying drawings in which:-

Fig. 1 is a flow diagram showing tool initialisation;

5 Fig. 2 is a block diagram of a data collection utility of the tool;

Figs. 3 to 9 are flow diagrams illustrating operation of the tool; and

Figs. 10 to 17 are sample outputs from a data display utility of the tool.

- 10 The invention provides a tool for local or remote monitoring of a PC's activity. The purpose of the product is to allow a manager easily monitor the use of different applications by users under his control.

This offers the following advantages:

- 15
- Determine who really uses different products and allocate licenses accordingly.
 - Provide training to the correct users for the correct products
 - Monitor user activity to determine amount of useful time spent on PC

20 There are three main components to the program :

- 1) Installation
- 2) Data Collection Utility (DCU)
- 25 3) Data Display Utility (PCVIEW)

The software architecture used allows the tool to be developed from a base tool for use in different applications. This allows simple modification of the program to fit into a client's product line or to provide additional functionality not contained in the
30 generic product release.

The Data Display Utility has a three-layered structure as follows.

Customisation Layer

- 5 The top layer (customisation) allows simple modification of the menus, language, toolbars etc in the application.

Data Analysis Layer

This allows delivery of a range of products on one core development.

- 10 • WorkMon is for use in Corporate Networks.
• WebMon monitors internet usage only.
• HomeMon is for domestic use and operates completely stand alone.
• CallMon is tailored for Call Centres usage.
• CollegeMon is for colleges.
15 • TeleMon is specifically designed for Teleworkers (ext to WorkMon).

The Data analysis is particular to each target area. In some cases only the data analysis and display sections change to provide these different products as in most cases the same collection program can be used.

20

Data Management Layer

This defines the database support.

The Data Collection Utility (DCU) also has a three-layered architecture as follows.

25

Customisation Layer

The top layer (customisation) allows simple modification of the window, menu, language etc in the application. Note that many of the application areas will not require any user interface on the Data Collection Utility.

30

Data Collection Layer

5 This allows delivery of a range of products on one core development. The data collection routines may be adapted to suit a particular application area, however it is unlikely that these will change much for most implementations.

Data Transport Layer

10 This allows use of different transport mechanisms for different application areas. RemoteMon may use email to transfer log files whereas LiveMon may use TCPIP to transfer information live to a server.

Regarding installation, there are two installations programs required:

- 15
- Data Display Utility installed on Manager's PC's (PCView)
 - Data Collection Utility installed on each user PC (DCUAPP)

The installation program as shipped performs the following functions :

- 20
- 1) Checks required disk space
 - 2) Creates install directory (user configurable)
 - 3) Installs PCView including external components as required.
 - 4) Generates install for DCU. The installer should allow a number of settings to be

25 configured for the DCU install as follows :-

- Install Directory
- LOGFILE directory. (to copy logfiles)
- Frame Interval (See DCU)
- DCU Snapshot interval (See DCU)
- IDLE time value (See DCU)

30

- LOGFILE transfer options

Select one or all:

- Startup
- Shutdown
- 5 • Manager specified Interval
- Manager specified times.

Note: This install can be created on a floppy disk if required.

The DCU Install performs the following functions:

- 10 1) Checks required disk space
- 2) Creates directory (as defined during Master Install)
- 3) Installs program files with predefined settings
- 4) Creates registry entry to automatically start DCU each time Windows95 starts.

- 15 The user can not change any parameters once the DCU install has been created. The settings by which the Data Collection Utility operates are stored in a configuration file and can only be overwritten by a new install prepared by the Manager (except LiveMon which includes the option to update settings Live over the network connection).

- 20 The tool is initialised as shown in Fig. 1. This illustrates that SnapShot, Frame, and TransferFiles timers are initially set up. A Live Mode server allows remote real time monitoring.

- 25 The data collection part of PCmon resides on the user PC and is executed on start-up. The purpose of the DCU is to silently record all user activity on a particular PC. The monitor utility does not adversely affect PC performance. The architecture of the application is modular such that new or different functionality can be easily integrated into the design.

The functionality of the DCU can be broken into three modules:-

- Data Collection
- Data Storage
- 5 • Data Transfer

The architecture is shown in Fig 2 and Figs 3 to 9 show its operation in detail.

Data Collection

10

The Data Monitor Module (DMM) is called on the expiry of a configurable timer (default = 10secs) and performs the following actions:

- 15 1) Checks for a Mutex to indicate that DCUStop is running indicating that the Collection Utility should terminate. DCUStop is a password protected application which allows a user or manager to terminate DCUAPP. It will also be used by the install utility to stop DCUAPP when upgrading software. It operates by setting a shared Mutex which is monitored by the DMM every time it is started. If the Mutex is set the DMM records an alert to the logfile indicating that it was terminated by the Mutex.
- 20 2) DMM checks if there has been any keyboard or mouse activity (see monitoring keyboard and mouse activity) and if not increments an idle timer count. Once this timer exceeds a user configured value (default 2 minutes) an idle task is logged to the logfile and all applications on PC are marked as background tasks.
- 25 3) Following these checks the DMM scans through all the top-level windows on the PC. This is achieved using the WIN32 API call EnumWindows which calls an

application defined callback function with the window handle of each window.

Within the callback function the DMM:

- Checks that the window is visible using the Microsoft IsWindowVisible function
- 5 and if it is not ignores that window and moves onto the next.
- Gets the title bar text from the window using the GetWindowText function
- It checks the text for certain conditions including null text and "Program Manager" in which case it ignores the window and moves onto the next.
- Then DMM searches it's internal data store (IDS) to see if it already has a record
- 10 of this window handle. If the handle is not found or the window text has changed since the last iteration of the counter a new record is created. (See creating a new record below)
- Finally the DMM increments either the foreground task counter or background task counter for the current record based on the value returned by the
- 15 GetForegroundWindow Function. Note there will be only one active window at a time indicating the application currently in use by the user.

The DMM returns to sleep until the snap interval timer expires again.

20 Creating a new record

The records are stored internally in a linked list to allow dynamic length lists and so the usual linked list management routines are performed to add new elements.

Various details are stored in each record including computer name user name current

25 time, OS Version, window title text, application name as well as a background and foreground time counters. The foreground timer is only incremented if the current window is the active window as indicated by the GetForegroundWindow function. The background timer is incremented if the window is visible on the desktop but does not have the current focus.

The difficult element to populate is the application name as there is no function available, which will return the application name associated with a particular window handle.

- 5 Under Windows NT the application name is obtained by reading the performance data statistics available in the registry. The code finds the process ID for the window handle using GetWindowThreadProcessId and then searches through the performance statistics for a matching process ID. The file name of the executable responsible for creating the window is included in the performance data and this is
- 10 extracted by DCUAPP.

Under Windows 95/98 the performance data is not available and instead DCUAPP uses the toolhelp library available on this platform. This works by taking a snapshot of all the running processes and scanning through each one that has a '.exe' or '.scr'

- 15 application filenameextension for the one with a process ID that matches the process ID associated with the current window handle.

Monitoring keyboard and mouse activity

- 20 To find out if the user is actually using the PC the Data Monitor must also check for mouse and keyboard activity. This is achieved by using the standard function SetWindowsHookEx to hook all keyboard and mouse messages for the system. This routine simply allows a callback function to be setup to intercept these messages and in the case of DCUAPP a counter is incremented each time a key is pressed. The
- 25 keystroke or mouse message is passed back to the system for normal processing. When DMM queries the counters they are reset to zero hence this can be used to see if there has been any activity in the interval since the last snap shot. Since there is virtually no computation in the callback function the affect on the performance of the system is minimal. In the future this algorithm may need to be expanded to take

account of voice activated systems, Infra Red and other forms of man machine interfaces.

Data Storage

5

The data records held by the Internal Data Storage module are backed up to disk automatically by a user configurable timer (default 5 minutes). The files are stored in a binary format to make it difficult for users to modify the data. There are plans to compute checksums to detect tampering with the data. Once stored to disk obsolete elements of the internal store are deleted, the counters for active elements are reset.
10 The process continues updating and adding to the records.

There is an additional option here to transfer the records over a live TCPIP link allowing the manager to have a live view of a particular computer. In this instance
15 the data is formatted and transferred to an application running on the manager PC. This link can also be used to customise operating parameters of the Data Collection Utility including timers and log file directories.

Data Transfer

20

The Data Transfer Module is responsible for transferring log files to a central server for interpretation by the Data Display Layer. Once copied the files are deleted from the user PC.

25 Security

There are a number of measures incorporated into the product to ensure that the data collected is a true representation of the activity on the users PC. These include:

- 1) DCUAPP protection. Should a user attempt to stop the data collection utility
30 using task manager the data collection utility will detect this and immediately

start a second application before terminating itself. The new application will start the collection utility about 10 seconds later. Any attempt to kill the protection utility will cause the PC to shutdown immediately.

- 5 2) Alert Log Mechanism. As well as storing application data to the log files the data collection utility stores alerts which include details like USER LOGIN, SHUTDOWN, etc. More importantly alerts are used to log attempts to stop the data collection utility.

- 10 3) Since the application is started by a registry setting the user may attempt to change this. This will mean that no records will be recorded for that user hence alerting the manager to a problem. Additionally since the product is a data monitor any attempt to tamper with the registry settings will be seen in the logfiles providing that the snapshot interval is not increased above a reasonable level. Using the live version of PCMON will highlight this weakness immediately.

Data Display Utility (PCView)

- 20 The data display utility is written in Visual Basic™ and uses Access™ to provide the database functionality. The Data Display program (PCView) operates as a standalone application and has a standard Multiple Document Interface(MDI). PCView allows the user to read in new data files load, generate new, load, save and print reports. It also allows the user to input 'friendly' names for applications and group data. It supports both text and graphical reports.

- 25

The main menu has the following options:-

- | | |
|------------------------|------------------------------------|
| • Report Manager | - Brings user to report menu |
| 30 • Data Manager | - Allows data management functions |

- Customize - Configuration options
- Exit - Close application and quit.

The following data is available to the display utility:

- | | | |
|----|----------------------------|--|
| 5 | • Current Time | - Start time of frame |
| | • Frame Interval | - Frame size in seconds |
| | • Snapshot Interval | - Snapshot interval in seconds |
| | • Application name | - Module name of process that created window |
| | • Window Title bar Text | - Text displayed on Title bar of window |
| 10 | • Foreground Time | - Amount of time spent as foreground task |
| | • Background Time | - Amount of time spent as background task |
| | • User Name | - Name used to log into Windows |
| | • Computer Address | - Unique Computer ID (e.g. Ethernet address) |
| | • Operating System Version | - Details of operating system in use on PC |
| 15 | • PCMON Version | - Digit code for current PCMON version |

The following tables are required in the database

Application List

- 20 This table contains a list of applications which may be grouped etc for display purposes
- ID - MSACCESS generated ID
 - Application name
 - Friendly Name

25

User List

This table contains a list of users which may be group etc for display purposes

- ID - MSACCESS generated ID
- User name

- Group - Identify group belong to

Computer List

This table contains a reference to all the PC's in the Log

- 5
- ID - MSACCESS generated ID
 - Computer Address
 - Group - Identify group belong to

PC Log

- 10 This table contains the list of records

- ID - MSACCESS generated ID
- Computer ID - Use lookup to Computer List
- User ID - Use lookup to User List
- App ID - Use lookup to App List
- 15 • Current Time - Start time of frame
- Frame Interval - Frame size in seconds
- Snapshot Interval - Snapshot interval in seconds
- Window Title bar Text - Text displayed on Title bar of window
- Foreground Time - Amount of time spent as foreground task
- Background Time - Amount of time spent as background task
- 20 • Operating System Version - Details of operating system in use on PC
- PCMON Version - Digit code for current PCMON version

Report Manager

25

This part is responsible for the display of data and reports. It allows the user to select the particular report details and format required and allows the report to be printed to hard copy. The user interface is simple and easy to use. Pie charts and bar graphs as

well as tabular reports are available. It is possible to cut and paste to other windows applications.

5 The User Interface selects data based on the following criteria entered by the Manager:

- Computer Address - select single/multiple or predefined group
- User Name - select single/multiple or predefined group
- Application Name - select single/multiple or predefined group
- 10 • Date - select range

Date is a special case and should include the following default selections

- Today
- This week
- 15 • This Month
- Last n days/weeks/months
- Pick dates manually.

Once the criteria is entered the UI will allow the User to select the format of the
20 display:

- Chart by App
- Chart by PC
- Chart by User

25 In the case of a text report the user may select the following fields:

- Application
- Machine
- User
- Date/Time

The report type defaults to the last used format and should be selectable for :

- Bar Chart
- Pie Chart
- 5 • Text Report

A sample report screen is shown in Fig. 10.

Sample reports by user show the amount of time spent by selected users using

10 selected applications on selected computers. For example, referring to Fig. 11, "who
uses Visual Basic™ most? This chart shows that Seamus uses this application most
and raises the question as to whether he should be sent on a training course.

The chart of Fig. 12 illustrates who spends most time on PCs. The chart of Fig. 13 is

15 an example of one illustrating the amount of time spent using selected computers
using selected applications by selected users.

The chart of Fig. 14 illustrates which PCs use an application most. The chart of Fig.

15 is an example illustrating the amount of time selected applications are used by
selected users on selected computers. This example suggests that some users may
need to be sent on an Excel™ course.

A question such as "which applications are normally run on PC X?" is answered by

a chart such as shown in Fig. 16. Information about what a particular user does is

25 provided by a chart such as shown in Fig. 17.

Data Manager

The Data menu gives the manager the option to import new data, if available. By

30 default the database is updated automatically each time it is opened. PCMON will

check for new log files immediately and update the database. The manager may delete a specified set of records, if for example they are confidential or an employee is no longer working in the organisation, etc. The manager may archive old data so that the database does not become too large and suffer unnecessary performance

5 problems due to out of date data.

Import new data

Delete Records

Archive old data

10

Included in the Data Manager is a facility to edit the application name to display a more user friendly name. Windows includes such modules as MAPIISP32.EXE etc which can be replaced by a friendly name e.g. Mail. Also by setting the 'Friendly Name' to <NULL> PCView will ignore associated entries.

15

Customize

The customise menu configures various user parameters. Some of the items include the auto-archive facility, file location directories, specification of daily working hours – used in calculating percentage working times.

20

Auto Archive setup

Log File directories

Specify Header/Footer for Reports (use to include company logo)

Define working hours

25 Restore Factory Default settings

The invention is not limited to the embodiments described but may be varied in construction and detail. For example, the tool may be modified in the following aspects.

30

- Log Web Sites rather than pages to reduce amount of data. Currently we record window title bar text which represents pages browsed but we could replace this by the Web Site name.

5

- Immediate log facility. A utility which would allow a manager to request the current logfile for a particular user immediately. i.e. What has user x been doing for the last hour? (Leave this as part of LiveMon??)
- End User Software Development Kit allow OEMs to change 'splash screens', configuration, title bars.
- Provide support for Database engines other than Microsoft AccessTM.

10

- Present data in html format for display using Web Browser.

It will be appreciated that the invention provides many advantages for human resource management and computer/application maintenance. These include the following.

15

Active monitoring of all PC applications by default, no user configuration required.

Records changes in Window titles, allows monitoring of web site access, email, documents opened.

20

Distinguishes between background and foreground tasks.

Records time spent using applications

25

Provides comprehensive Data Display Utility to present results in simplified chart formats for analysis

Protection against power loss and malicious intrusion.

Can be used locally on single PC or transmit files to central location.

30

Does not interfere in PC operation and user may be unaware of presence of PCMON
(entry in task list only).

5 Modular design allows ease of integration with other products and upgrading
functionality to include features such as live on line reporting of PC activity to host
PC.

Supports clipboard to allow transfer of reports to applications such as work
processing applications.

10

The invention is not limited to the embodiments described but may be varied in
construction and detail.

15

20

25

30

Claims

1. A computer usage monitoring tool comprising means for determining which
5 software applications are currently executing on a computer and for logging
usage data to a storage medium, transparently to a user.
2. A tool as claimed in claim 1, wherein the tool comprises means for determining
the current applications by identifying visible windows.
10
3. A tool as claimed in claims 1 or 2, wherein the tool comprises means for
determining the current active application by identifying an active window.
4. A tool as claimed in claims 1, 2 or 3, comprising means for recording an
15 application as inactive if its window is active and there are no user inputs for a
pre-set time period.
5. A tool as claimed in any preceding claim, further comprising means for capturing
window titles and using the titles and window handles to identify an application.
20
6. A tool as claimed in any preceding claim, further comprising means for
maintaining widow foreground and background timers indicating window
display times with user input and without user input respectively.
- 25 7. A tool as claimed in any preceding claim, further comprising means for
maintaining a linked list of widows uniquely identified by window handles and
title text, and for dynamically updating said linked list with new entries.
8. A tool as claimed in any preceding claim, further comprising an activation timer
30 which activates monitoring at configurable time periods.

9. A tool as claimed in claim 8, further comprising means for monitoring user input activity between activation by the activation timer.
- 5 10. A tool as claimed in any preceding claim, wherein the tool comprises a frame timer for controlling timing of frame writes to a log file or to an open network connection.
- 10 11. A tool as claimed in any preceding claim, further comprising a log file timer for controlling timing of log file transfers.
- 15 12. A tool as claimed in any preceding claim, wherein the tool comprises a protection utility comprising means for restarting the Data Collection Utility in the event of a user attempt to terminate same and shut down the operating system if a user attempts to terminate the protection utility.
13. A computer usage monitoring tool substantially as described with reference to the drawings.

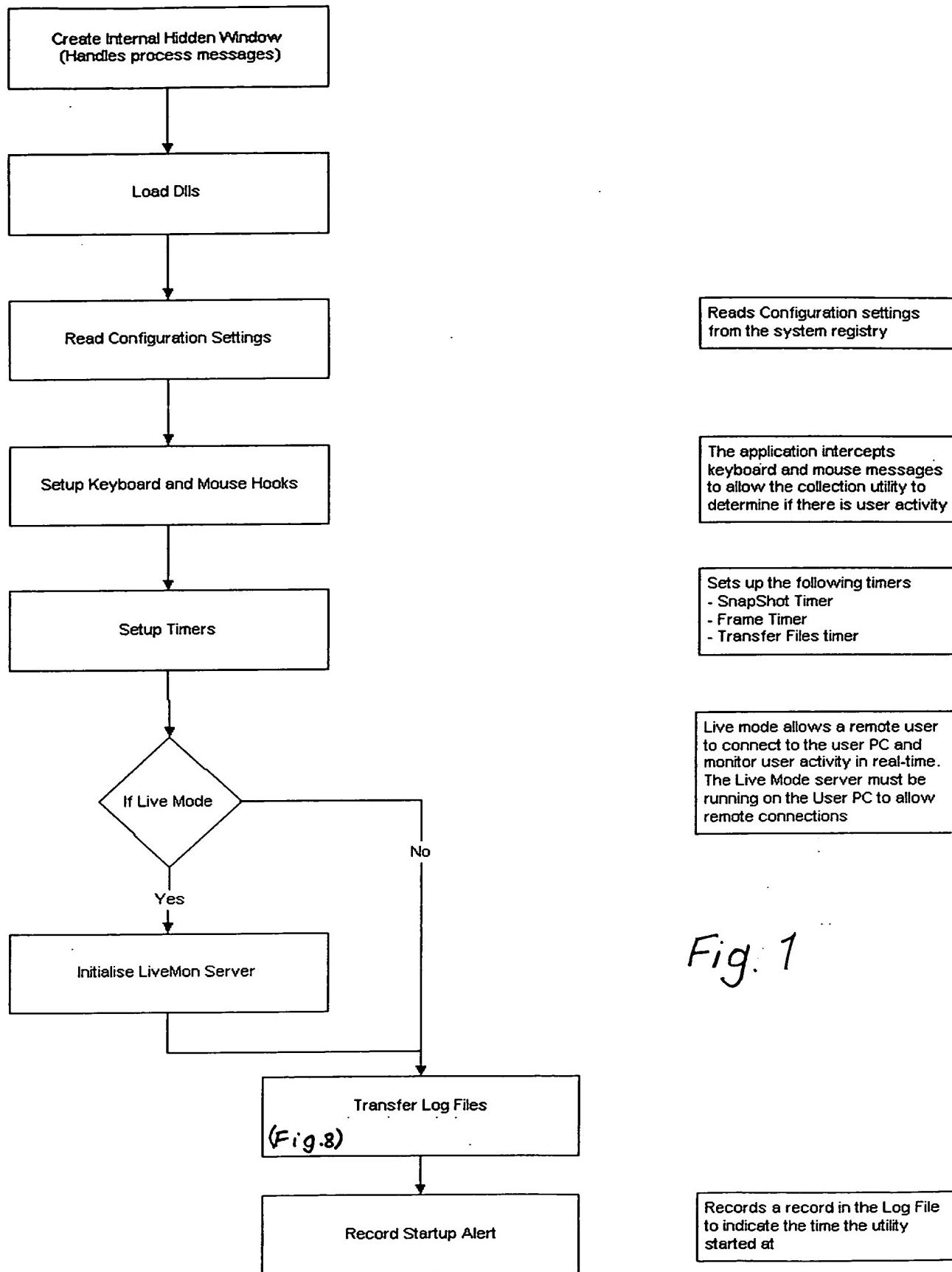
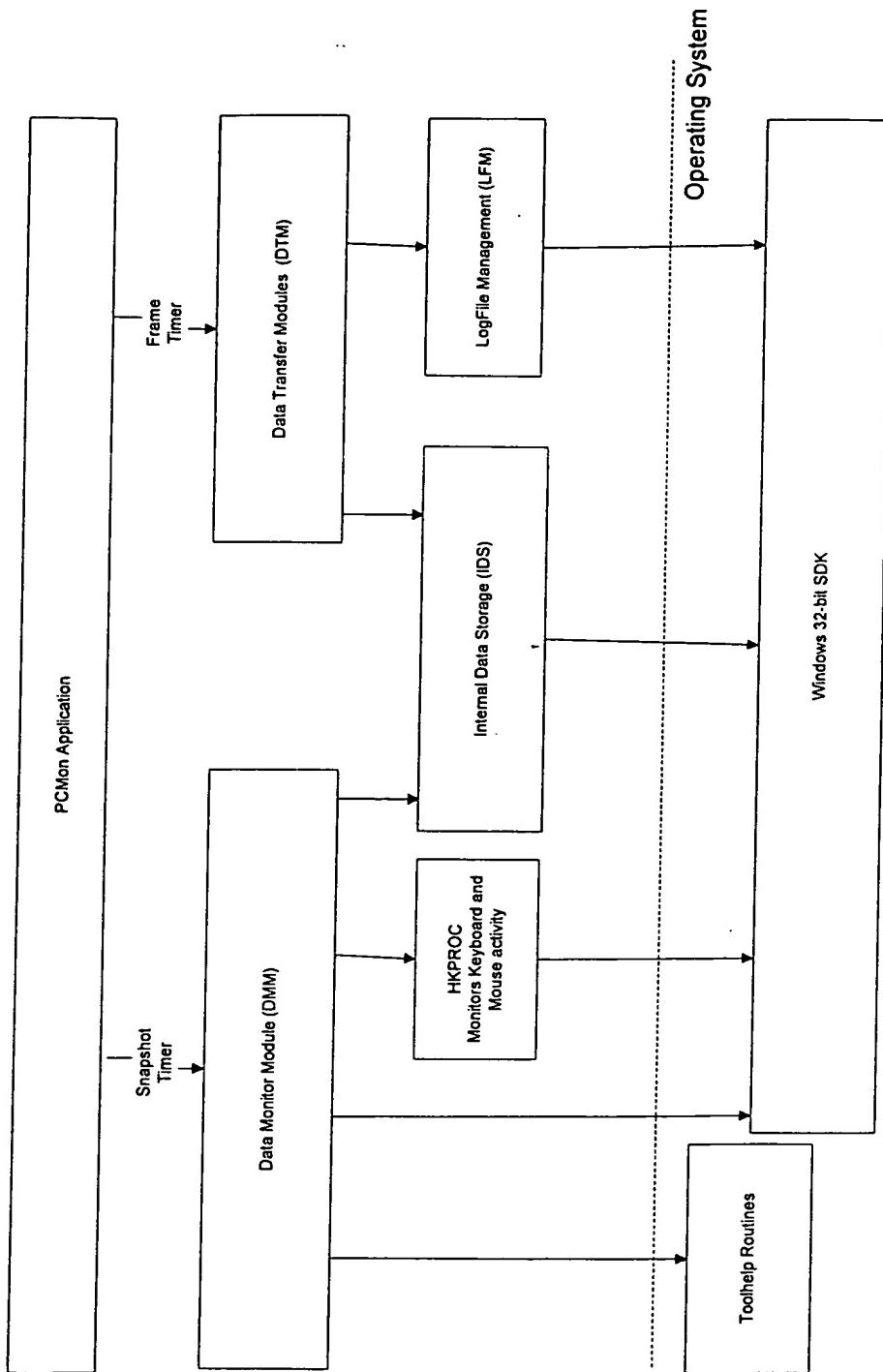


Fig. 1

Data Collection Utility- Detailed Architecture Drawing

Fig. 2

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3/13

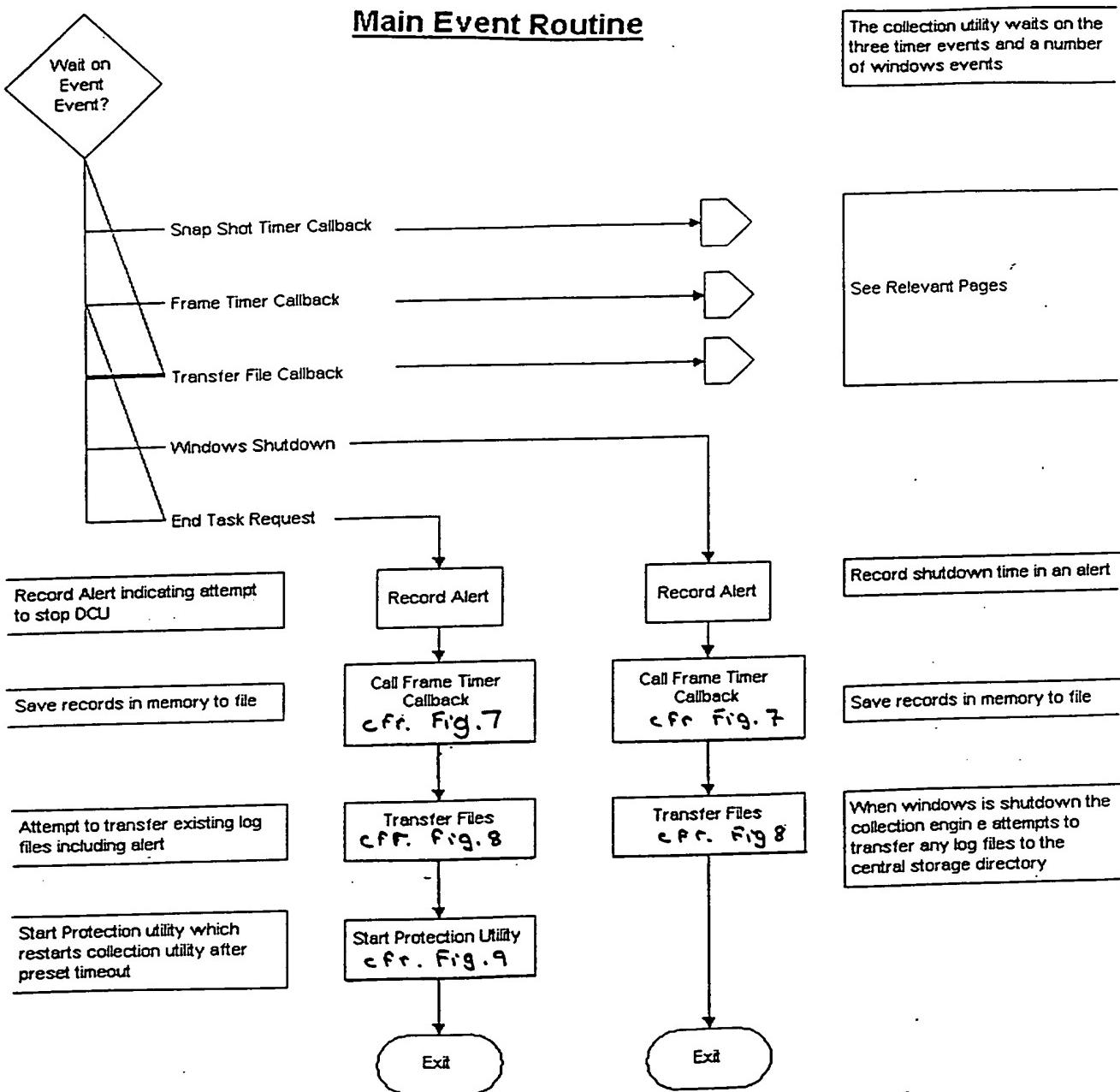


Fig. 3

SnapShot Timer Callback Routine

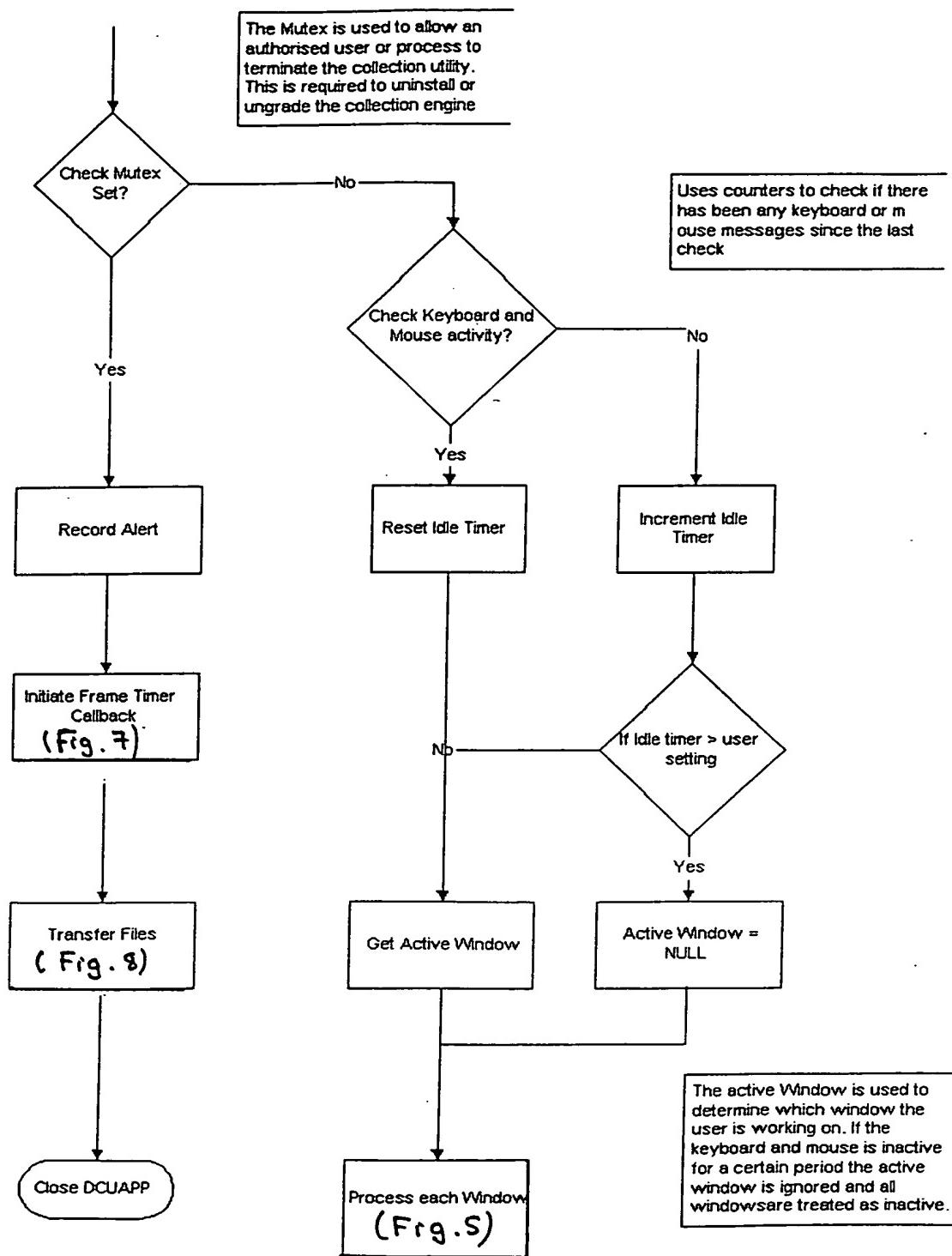


Fig. 4

Process Window Callback

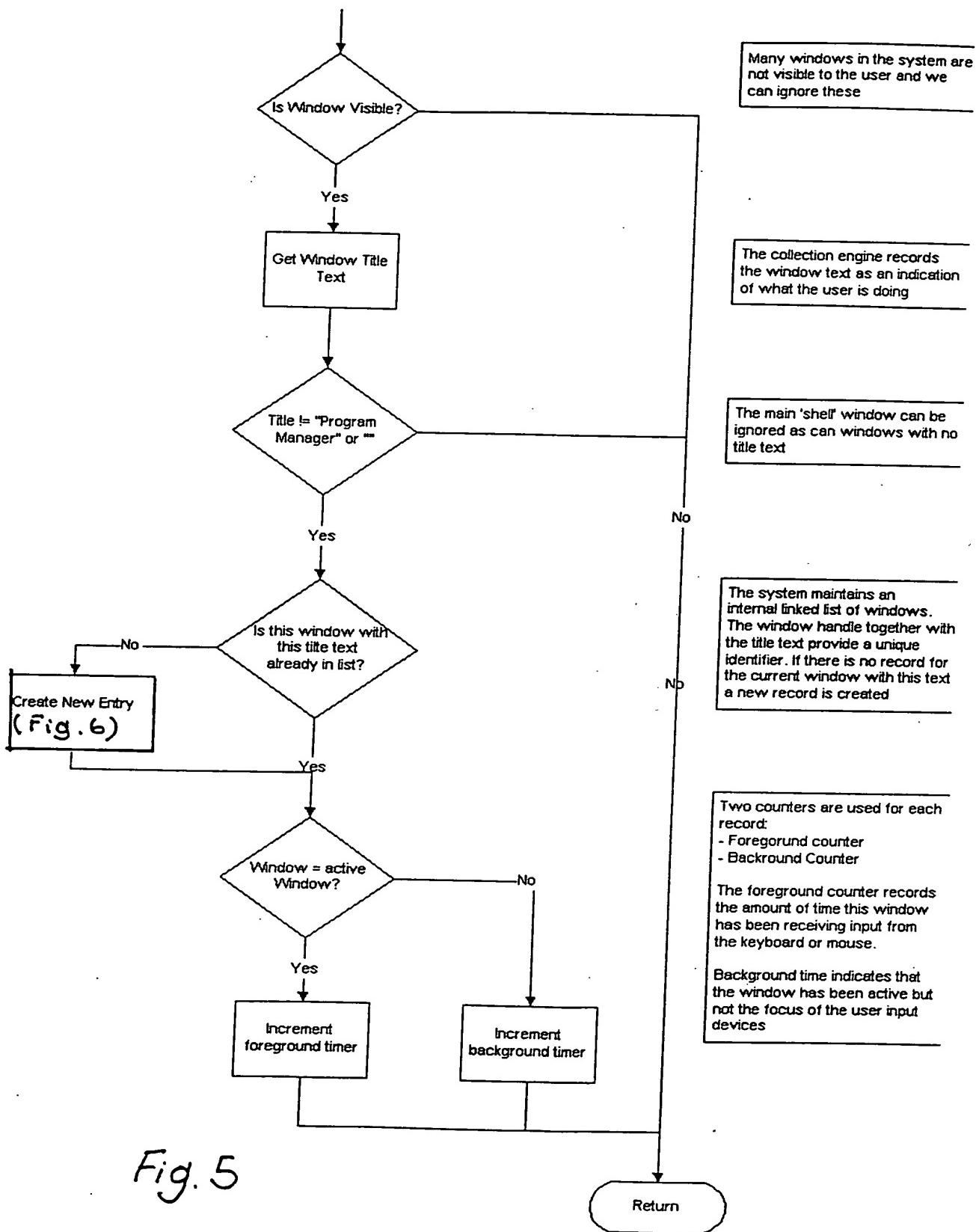


Fig. 5

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Create New Entry

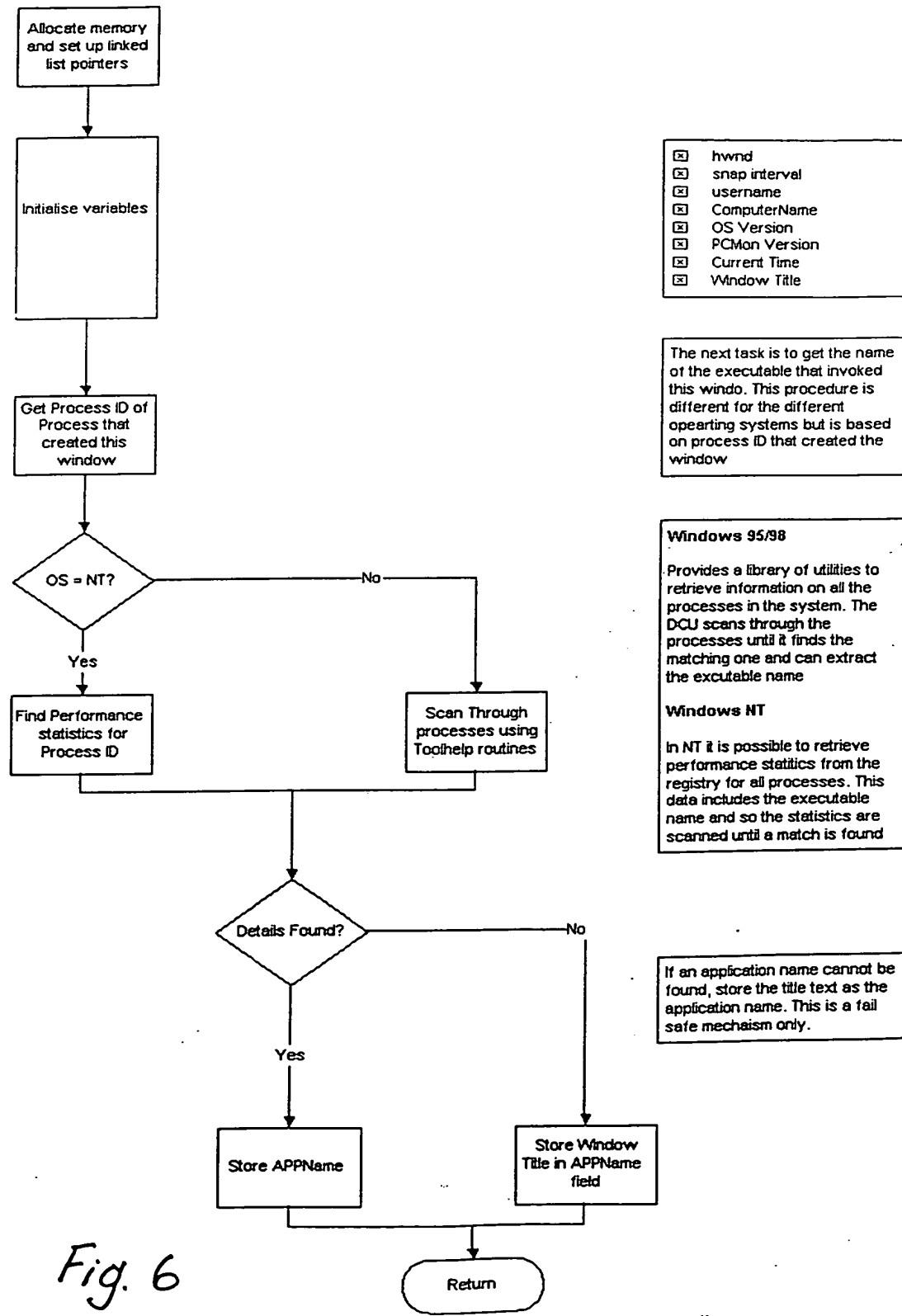


Fig. 6

7/13 Frame Timer Callback

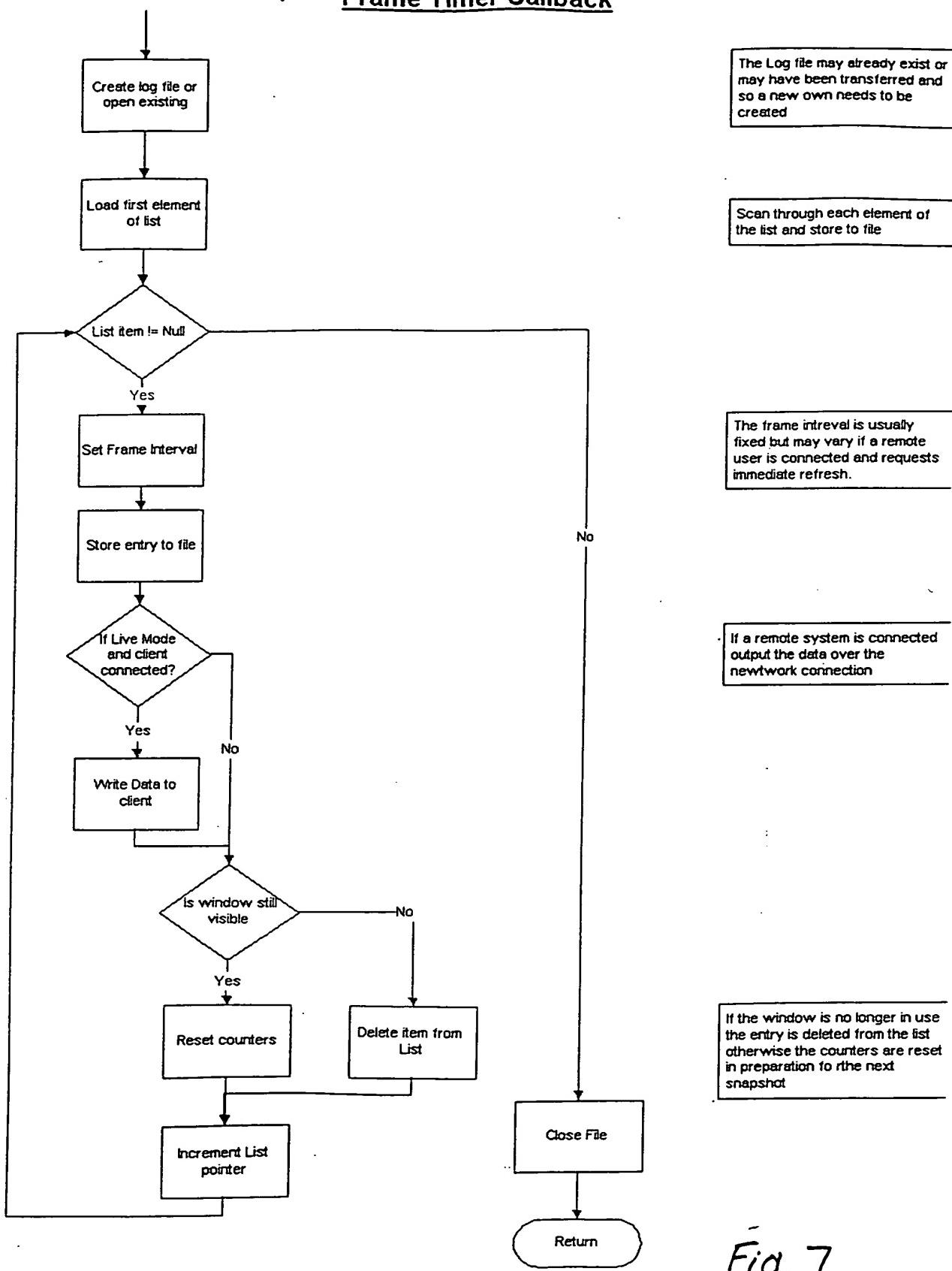
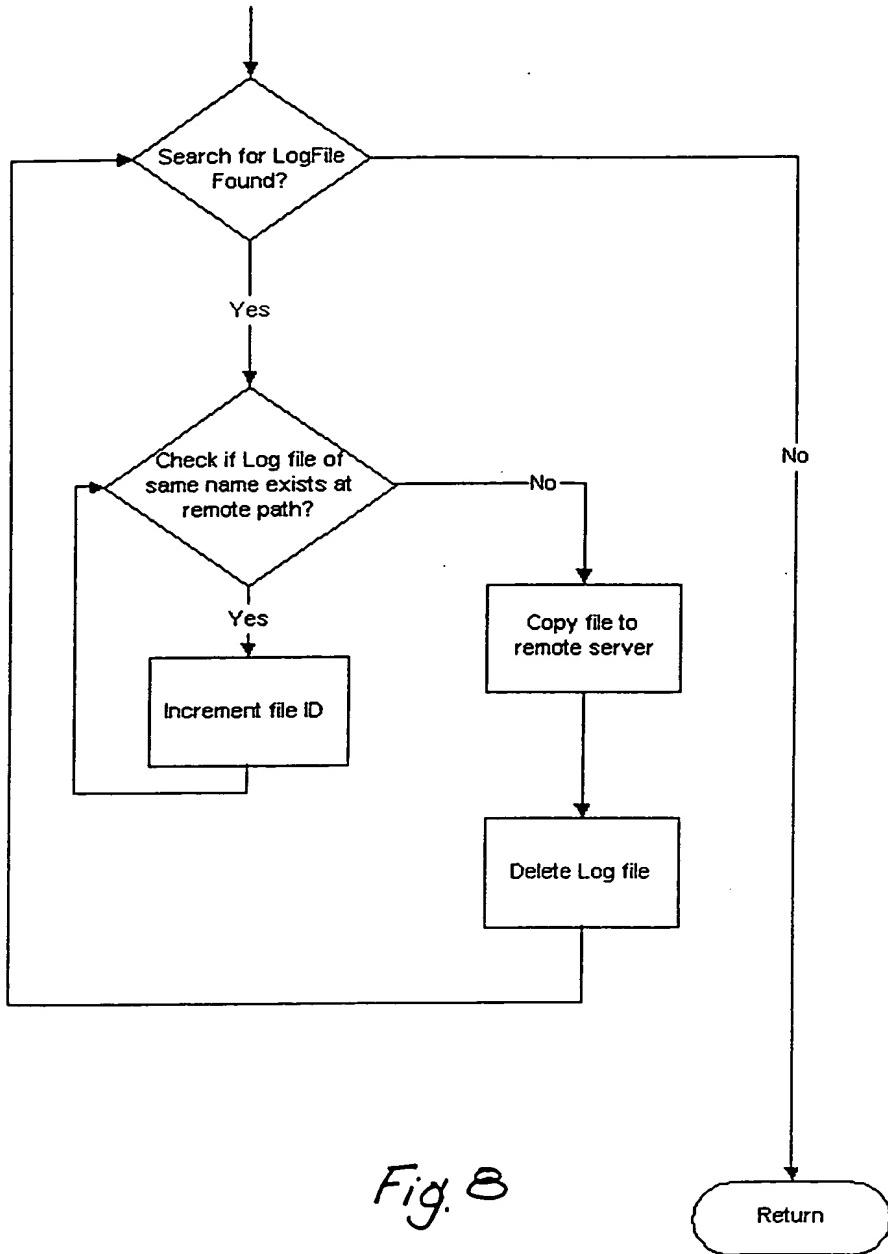


Fig. 7

Transfer Log Files Callback



The Log Files are copied from the DCU Log File directory to the central directory as specified in the configuration settings

Log Files are identified by the user name and date and since a file of the same name may already exist so the DCU appends _nn to the filenaem where nn is a unique identifier.

If the file already exists the value of nn is incremented until a unique filename is found.

Once the file is copied to the storage directory it is deleted from the local PC

Fig. 8

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Protection Utility

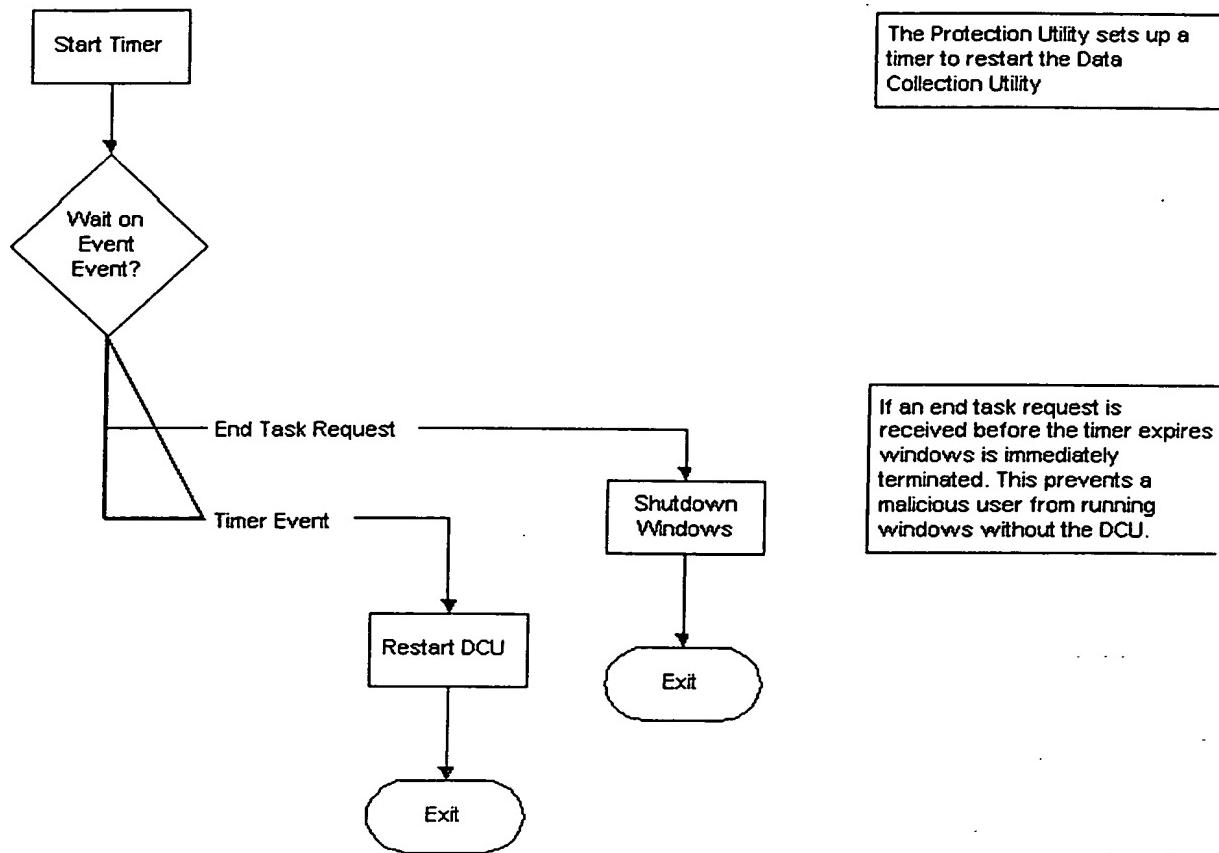


Fig. 9

10/13

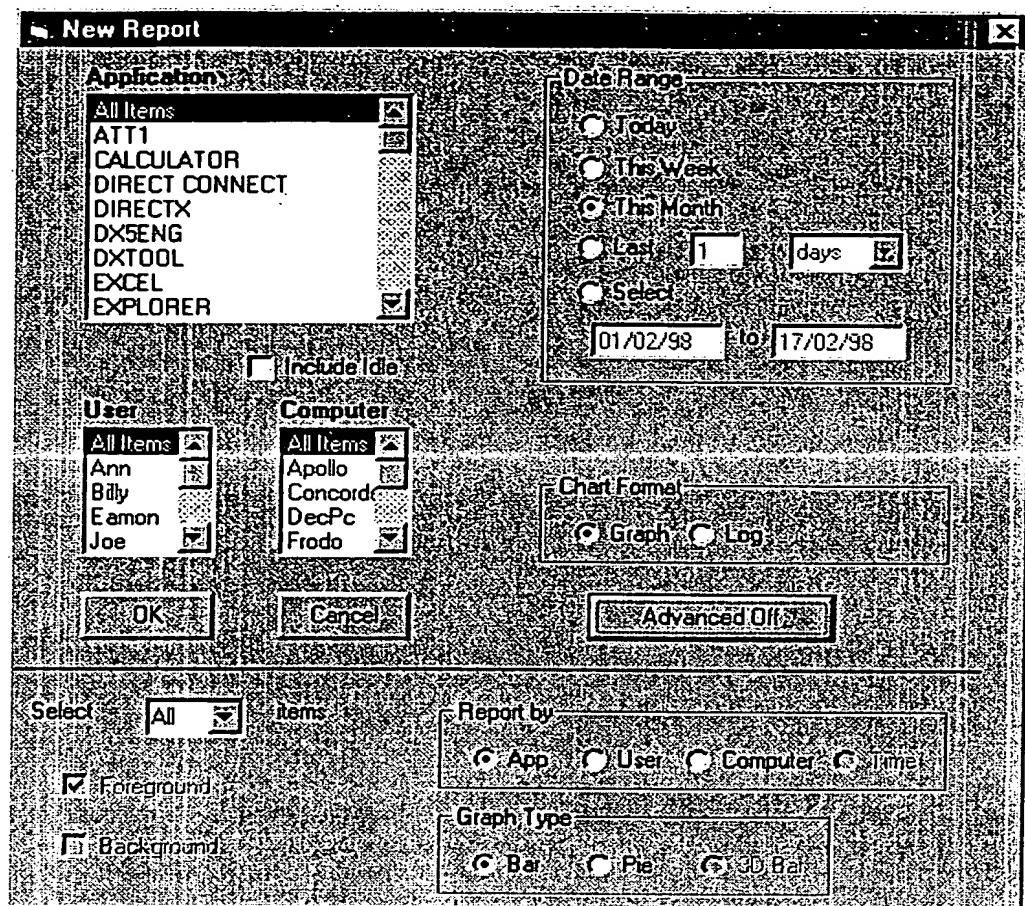


Fig. 10

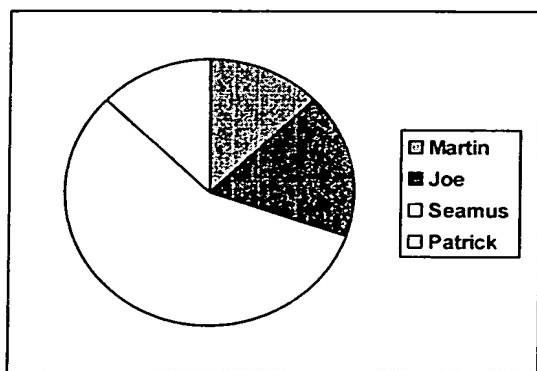


Fig. 11

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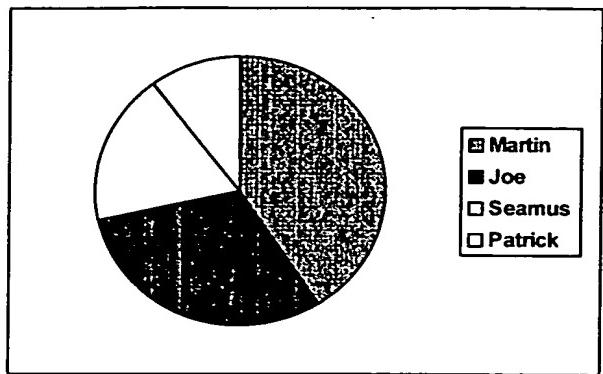


Fig. 12

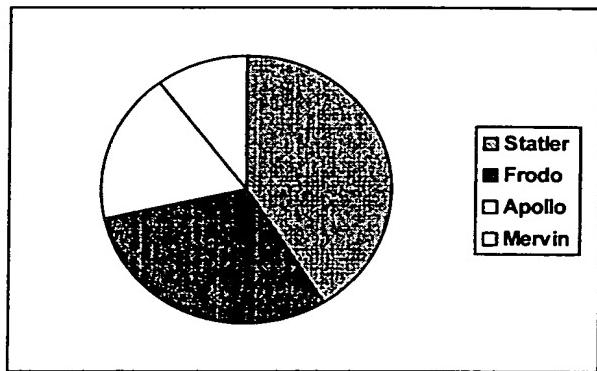


Fig. 13

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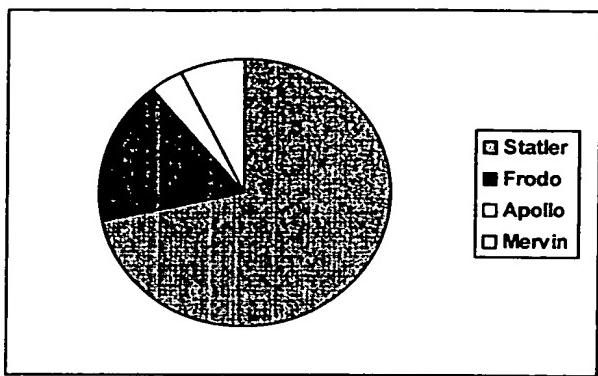


Fig. 14

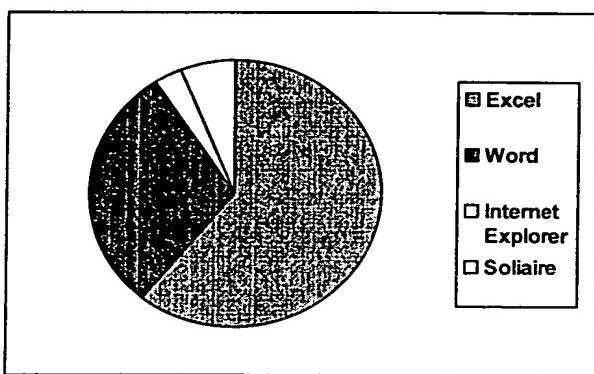


Fig. 15

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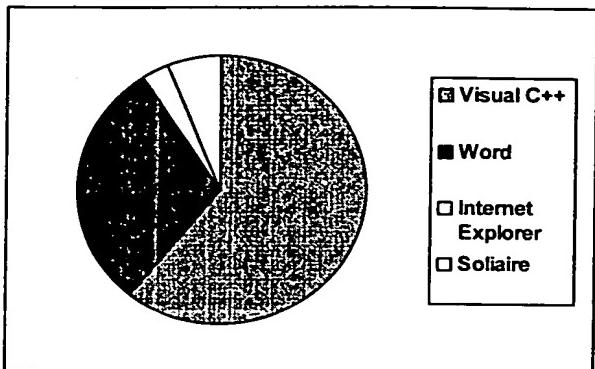


Fig. 16

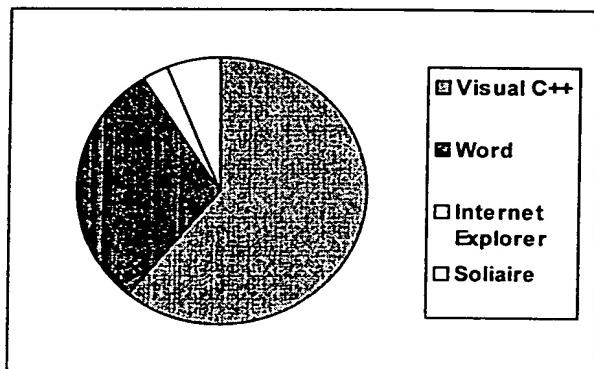


Fig. 17